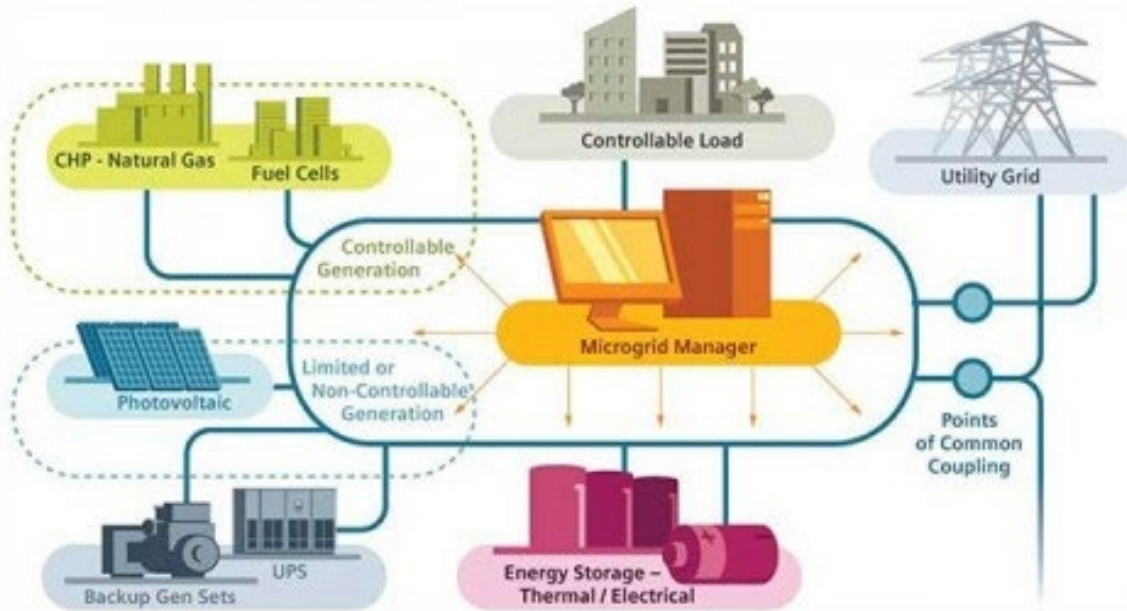


Artificial Intelligence and Reinforcement Learning for Microgrid and Smart Community Energy Management

In 2016, U.S. electric utilities had about 70.8 million advanced (smart) metering infrastructure (AMI) installations. About 88% of the AMI installations were residential customer installations. The community energy market is rapidly growing and evolving, and focus has increased on residential energy management. Residential electricity consumption accounts for 38% of the total electricity consumption in the U.S., making residential consumers a potential candidate for demand reduction during peak hours. Financial incentives for the consumers are key to encourage consumers to participate in such demand reduction events. There are different demand reduction strategies (e.g., incentive-based and price-based techniques) to encourage consumers to participate in the demand reduction events.

In this project, we will explore a variety of artificial intelligence and reinforcement learning methods to find a solution to efficiently meet the required criteria utilizing the available resources. For example, in the case of electrical energy management, the optimization algorithm should be adopted to use electric appliances to match the total electricity demand reduction while satisfying the users' needs. An example of community microgrid is provided below.



Picture source:

https://www.cityofpittsfield.org/departments/community_development/city_of_pittsfield_downton_microgrid.php